Attachment 3

THE AGENCY'S RESPONSE TO COMMENTS ON THE AQUATIC RISK ASSESSMENT FOR METHYL PARATHION

Most of the comments received for the EPA preliminary risk assessment were submitted by Cheminova, the major registrant for methyl parathion. Cheminova disputes the results of EPA's draft aquatic risk assessment on several points, and has produced their own assessment based on what they consider "more appropriate" model inputs and toxicological endpoints. Based on their assessment, Cheminova claims that few aquatic levels-of-concern are exceeded by use of methyl parathion. Cheminova performed their assessment three different ways to bolster their argument. In the first, Cheminova performed PRZM-EXAMS simulations using what they believed were "more appropriate" input parameters, then compared these to EPA's toxicity endpoints. Cheminova then compared these revised EECs to what they termed to be "more appropriate" toxicity endpoints. Finally, Cheminova compared these endpoints to results from the USGS NAWQA surface-water monitoring program. The specific issues raised by Cheminova are addressed in EPA's response which follows.

Although some of Cheminova's comments will result in revisions to the EPA preliminary risk assessment, the general conclusions reached in the original preliminary risk assessment remain the same.

Use of EPA Models with Different Input Parameters

Cheminova disputes the environmental fate parameters used as input to the Tier II PRZM/EXAMS modeling. For each disputed parameter, Cheminova substitutes a much less conservative value for their modeling. Specifically, they make the following substitutions:

> **1.** Cheminova substituted a field degradation rate in place of aerobic soil metabolism for modeling purposes.
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> **EPA Response:** EPA believes it is inappropriate to use a field dissipation half-life in the PRZM model. A field dissipation rate is the result of a combination of numerous degradation and dissipation pathways in an actual field environment. EPA's current tools for modeling the fate of a chemical after field application consider the contribution of a number of individual degradation and dissipation pathways. Valid field dissipation data are used in risk characterization and to evaluate the predicted chemical dissipation rates and degradation products. To substitute a field dissipation half-life for soil metabolism as an input parameter would have the erroneous effect of "double counting" many of the other dissipation and degradation pathways.
>
> **2.** An aquatic aerobic degradation half-life of 1 day was used instead of the 4.1 day half-life used by EPA.

EPA Response: The aerobic aquatic metabolism half-life of 4.1 days used by EPA was taken from a scientifically valid laboratory study submitted by the registrant (MRID 42069601). **This value is consistent with values found in the open literature.** Howard (1991) cites degradation rates for methyl parathion of 3.2 to 6.4 days in water-sediment cores, 2.3 days in non-sterile sediment, > 30 days in nonsterile water, sterile water, and sterile sediment, 0.9 to 30 days in sediment/water slurries. Howard et al. (1991) report that methyl parathion half-lives range from 15 to 70 days in unacclimated aerobic aquatic environments, 1 to 7 days in unacclimated anaerobic aquatic environments, and 8 to 38 days in surface water. Hornsby et al., 1996 reports the half-life for methyl parathion is 5 days. EPA stands by the half-life used in the risk assessment.

3. A foliar dissipation rate of 1 day was used in the calculation of EECs.

EPA Response: Cheminova cites data which they claim "suggests an upper bound value of 1 day is appropriate for the foliar dissipation half-life", although the half-lives they list range up to 38 hours. Willis and McDowell (1987) reported a number of methyl parathion foliar half-lives ranging from 0.1 to 13.5 days, with most values being <2 days. EPA's avian and mammalian assessment uses a foliar half-life of 2.4 days, which is the upper 90th percentile confidence limit of the mean value. As indicated below, EPA did not use a foliar dissipation half-life for PRZM/EXAMS modeling, because it is not an appropriate input. EPA stands by its use of a 2.4 day foliar dissipation half-life.

4. A Koc of 5100 was used instead of the value of 487 ml/g used by EPA.

EPA Response: The Koc of 5100 used by the registrant is described in Hornsby, et al.(1996) as "an 'estimate,' meaning either (a) an unusually wide range of values have been reported and we had no reason to select any one value as a 'best' value, or (b) no experimental value is available but a reasonable estimation was possible" or a value was "calculated from some more fundamental property". The Koc of 487 ml/g used by EPA was chosen based on experimental data submitted by the registrant. The registrant will repeat the adsorption-desorption laboratory study, because the soils the original study were autoclaved.

However, the Koc of 487 ml/g used by EPA is conservative, but not unreasonable given the data reported in outside literature. Simple partition coefficients for methyl parathion can range from 3 to 147 (median=50) (Howard, 1991). Sanchez-Martin and Sanchez-Camazanoe, (1991) found that the methyl parathion sorption on soil was correlated to the soil organic carbon content. They found the mean Koc for methyl parathion is 697 ml/g across 8 mineral soils. The registrant states that EPA Office of Research and Development reports the range in Koc for methyl parathion from 346 to 15,930 ml/g. Hornsby, et al. (1996) reports organic carbon partitioning coefficients of 424 and 14000 ml/g in addition to the 5100 chosen by the registrant.

The registrant contends the Koc of methyl and ethyl parathion should be similar because they have similar water solubilities. EPA notes that water solubility is not adequate predictor of soil sorption affinity. In any case, EPA disputes the Koc of 5000 cited by the registrant for ethyl parathion, which is also described as an estimate in Hornsby, et al. (1996). EPA will discuss the adsorption coefficient of ethyl parathion further in the revised EPA ethyl parathion risk assessment. EPA stands by the use of the use of a Koc of 487 ml/g.

Comment: Cheminova notes that the 11.25 day aerobic soil-metabolism half-life used in the preliminary risk assessment far exceeds the 3 to 7-day application interval used on most crops. The value used by EPA represents the 90th percentile value calculated from an unacceptable aerobic soil metabolism study.

EPA Response: The half-life for parent methyl parathion (3.75 days) was derived from upgradable supplemental data; the study provided useful information for methyl parathion, but the study was deemed as supplemental because of inadequate identification of degradation products. Quantitatively, the aerobic soil metabolism half-life of methyl parathion, assuming a normal distribution, can range anywhere from an approximate mean half-life or central tendency of 3.75 days to an upper bound 90th percentile upper confidence limit (UCL) of the mean (11.25 days). As per interim guidance on model input parameters, the 90th percentile UCL of the mean is used in PRZM-EXAMS modeling in situations where the only one half-life is available. This correction factor assumes that half-lives in different soils are normally distributed. The correction factor is used to incorporate uncertainty in the variability of the half-lives.

EPA is currently moving towards a probabilistic approach for modeling that will enable increased consideration of a parameter's distribution, where available data are of sufficient quantity and quality, in the calculation of EECs. Until such time that EPA adopts a probabilistic exposure assessment, EPA will use the 90th percentile UCL of the mean in an attempt to be reasonable and protective of non-target populations.

Howard et al. (1991) indicate the aerobic soil metabolism half-lives for methyl parathion can range from 10 to 365 days. The authors note that soil degradation rates were faster at concentrations less than 100 µg/g.

Finally, for foliar-applied insecticides such as methyl parathion, the relationship between application interval and the aerobic soil metabolism half-life may not be strong.

Comment: EPA assumes no foliar dissipation in its PRZM/EXAMS modeling, but states elsewhere in the preliminary risk assessment that the upper 90th percentile confidence limit value for the foliar half-life is 2.4 days.

EPA Response: EPA did include foliar dissipation in the original EECs to the extent possible in the PRZM-EXAMS modeling. The model includes two input cards for foliar dissipation. The first, the "foliar extraction" card, regulates what mass fraction of the pesticide will wash off the leaves with a centimeter of rainfall. EPA sets this to 0.5 as a default.

The second input card is **decay rate on foliage**. Foliar decay data was not available for methyl parathion. Foliar dissipation includes not only decay, but other processes such as washoff and volatilization. Therefore, the use of foliar dissipation in this input slot would account for decay, but double-count for foliar washoff. Therefore, it would have been inappropriate to use the foliar dissipation value in the model.

Comments on Modeling

Cheminova Comment: The "structure" of the PRZM/EXAMS modeling system is "inappropriate". The scenario represented by the models is "not an accurate reflection of a watershed large enough to support a drinking water facility."

EPA Response: EPA uses PRZM-EXAMS modeling as a screening tool in an attempt to efficiently determine which pesticides will *not* pose a risk to people through drinking-water exposure. If the modeling results suggest a potential for drinking-water concerns, EPA will further evaluate the results in the context of available water monitoring data. The risk characterization in the methyl parathion risk assessment includes a detailed comparison of the results and uncertainties of the modeling and monitoring.

EPA has encountered a number of cases where monitoring data for ecologically important surface water were in excess of concentrations predicted by the 1-hectare pond scenario. In addition, EPA conducted a comparison of contaminant predictions for the field pond scenario and an index reservoir of larger surface area, volume, and drainage area for presentation to the July, 1998 Science Advisory Panel. Predicted concentrations of hypothetical uses of selected pesticides were higher in the index reservoir than in the 1-hectare pond simulated by PRZM-EXAMS.

The risk characterization clearly indicates that the risk assessment for aquatic organisms is not solely based on PRZM-EXAMS exposure predictions. Substantial evidence from the open literature indicates effects to aquatic organisms from exposure to methyl parathion. In addition, toxicity data for freshwater and estuarine/marine invertebrates indicate that methyl parathion will cause acute effects at concentrations such as those detected in surface water samples from the recent Mississippi Embayment NAWQA study.

As described in the preliminary risk assessment, methyl parathion has been detected in targeted surface-water monitoring programs in California and the Mississippi Embayment. In the risk characterization, EPA expresses more confidence in using the 6 ppb concentration from targeted monitoring than the 254 ppb modeling result for use in the human-health risk assesment. However, EPA is not certain from the limited targeted monitoring data available that the 6 ppb value is sufficient to assess risk. More targeted monitoring data would be necessary to allow for better quantification of the concentrations that might occur in surface water.

Cheminova Comment: EPA admits that PRZM 3.1 is not validated, which calls the model predictions into question.

EPA Response: Validation of the surface water models is problematic because there are insufficient data on pesticide concentrations in surface waters. EPA is addressing the model evaluation issues using the following approaches: 1.) OPP and USGS are conducting a pilot nationwide monitoring program of drinking water reservoirs to generate foundational data for risk assessment and model evaluation; 2.) there is an industry task addressing model validation; and 3.) EPA is conducting a preliminary model evaluation of PRZM-EXAM predictions with existing monitoring data (www.epa.gov/pesticides/sap).

Cheminova Comment: Application dates of methyl parathion during 36 year PRZM-EXAMS simulations should be "modified" to reflect application days with 3 cm of rainfall per day or less. They believe that methyl parathion would not be applied on days with substantial rainfall because of the possibility of foliar wash off.

EPA Response: EPA agrees that methyl parathion is not expected to be applied during or immediately before rainfall events. PRZM-EXAMS modeling, however, is a probabilistic assessment tool which captures the stochastic nature of rainfall patterns and subsequent runoff events over time. Additionally, PRZM has a minimum time step of a day (24 hours) which limits assessment of rainfall duration and intensity on time scales less than a day. Therefore, PRZM-EXAMS modeling results allow an probabilistic return frequencies (1:10 year) for estimated environmental concentrations (EEC) for a specific use site. EPA is interested in the registrant's scientific rationale for using 3 cm rainfall/per day or less as a cutoff for methyl parathion application.

Cheminova Comment: Although EPA solicited input from agricultural experts on the typical rates of methyl parathion likely to be used in the field, "unrealistic" maximum label rates were used for the risk assessment.

EPA Response: The information gathered from agricultural experts is instructive for the characterization of potential risk from the use of methyl parathion. For those species, such as freshwater fish, for which the RQs are not well beyond LOCs, consideration of typical rates may help in evaluating the uncertainty of the risk assessment. In addition, knowledge of application rates most likely used in the field are useful when considering possible mitigation by reduction of the "unrealistic" maximum label rates.

Until the maximum label rates are reduced, however, EPA will use extant maximum rates in our risk assessments. These maximum rates are those supported by the registrant for establishment of tolerances. Registrants are free to reduce maximum label rates without submitting additional data to the agency.

Certain areas of the methyl parathion use area for a particular crop are likely to be more prone to severe infestation than the "typical", and therefore the maximum rates might be used more often. Using the maximum rate which can legally be used for a particular crop is the only way to ensure that environmental resources are protected throughout the use area. EPA stands by the use of maximum label rates in its risk assessment.

Cheminova Comment: EPA erroneously applied the same assessments to the emulsifiable concentrate and Penncap-M microencapsulated formulations, although they should have distinct toxicity and exposure input parameters.

EPA Response: EPA uses toxicity studies submitted by the registrant which are performed using the active ingredient (technical), not a formulated product. The registrant's environmental fate laboratory studies are also performed using the technical product. The results of these studies are used to determine the inputs for EPA's exposure models, and the toxicity endpoints against which we compare the exposure estimates. Although Elf-Atochem is currently preparing field dissipation studies for Penncap-M, EPA currently does not have environmental fate nor ecological effects laboratory studies specific to either formulation.

The toxicity of the EC and Penncap-M formulations should not differ significantly. However, the exposure profile for the two formulations may differ. The microencapsulation of methyl parathion in the Penncap-M formulation is likely to delay the release of methyl parathion, changing the exposure profile and extending the persistence of toxicity. The State of Washington (Mayer, et al.,1996), for instance, informs beekeepers to avoid fields treated with Penncap-M for 5 to 8 days; beekeepers are told to avoid fields treated with the EC formulation for at least a day.

Cheminova Comment: "For the Pesticide Root Zone Model (PRZM), EPA used different values for the adsorbed and aqueous aerobic soil half-lives in different scenarios."

EPA Response: The registrant is correct. The half-lives for the cotton, grape and potato scenarios were inconsistent. These have been corrected so that all are consistent. It should be noted that the scenarios which included different half-lives produced estimated concentrations similar to the corrected versions. The corrected value for cotton is 254 ppb instead of 214 ppb. The corrected value for grapes is 7.0 ppb instead of 6.4 ppb. The corrected value for potatoes is 21 ppb instead of 39 ppb.

The revised values do not change the conclusions of EPA's risk assessment.

<u>Calculation of RQs Using Different EECs, Endpoints</u>

Cheminova Comment: EPA should use the 4-day concentration from modeling for the acute EEC, not the instantaneous.

EPA Response: Existing toxicological studies are very limited in their ability to distinguish between latent expression of adverse effects from short exposures and those effects requiring more protracted exposure for expression. In other words, the available toxicity studies can not determine how long organisms must be exposed before effects occur.

EPA will consider the use of the 96-hour predicted EECs in the calculation of acute RQs, provided that available toxicological data demonstrate that exposures less than 96-hours do not result in the observed adverse effects in the test organisms.

Cheminova Comment: "EPA indicates that it has a high degree of certainty concerning its conclusions about potential impacts of methyl parathion on estuarine/marine fish and invertebrates." However, in addition to concerns Cheminova has with EPA's choice of model input parameters, the field pond scenario in the modeling "is not representative of estuarine/marine water bodies." This leads to "low confidence and high uncertainty" for the estuarine/marine assessments.

EPA Response: EPA agrees that the risk assessment should not claim a high degree of certainty in the risk to estuarine and marine fish. There are several reasons to predict risk to estuarine and marine fish. Studies cited in the preliminary risk assessment indicate that methyl parathion is "very highly toxic" to estuarine/marine fish. In addition, the preliminary risk assessment cites open literature data that showed effects in estuarine fish at concentrations that had previously been measured in the San Francisco Bay estuary (Finlayson, et al 1993), and another studies that postulates a correlation between pounds of methyl parathion used and declines in striped bass populations in the Sacramento and San Joaquin Rivers (Foe et al., 1991 and Heath, A.G.et al.,1993). Finally, the RQ values calculated using PRZM/EXAMS which correspond to the highest use rates exceed LOC's by two orders of magnitude.

However, the uncertainty in using the PRZM/EXAMS models for estimating estuarine/marine exposure still makes it difficult to claim a "high degree of certainty" for risk to estuarine and marine fish. Given the wide range of depths and flushing rates of estuaries, for instance, EPA cannot be sure whether values predicted by PRZM/EXAMS are underpredictions or overpredictions of potential exposure. In addition, EPA is not aware of estuarine or marine monitoring data that include detections of methyl parathion at concentrations equivalent to the 29.5 ug/l acute LOC used in the risk assessment for estuarine and marine fish.

EPA stands by its statement that there is high certainty in effects to estuarine and marine invertebrates, because that assessment does not rely on PRZM/EXAMS exposure simulations. Effects on estuarine invertebrates have been observed in the field; Finlayson et al. (1993; MRID 44572901) reported methyl parathion toxicity to a mysid species (*Neomysis mercedis*) in a California estuary. In addition, several studies cited in the estuarine/marine invertebrate risk assessment reported surface water detections of methyl parathion at concentrations higher than the mysid EC50 of 0.35 ug/l. As detailed in another comment response below, methyl parathion has been detected at concentrations greater than 0.35 ppb in recent, targeted surface-water monitoring performed as part of the Mississippi Embayment NAWQA study.

As detailed in an earlier comment response above, EPA does not agree with Cheminova's comment that EPA made "inappropriate choices for key model input parameters."

Cheminova Comment: Despite a lack of chronic toxicity data for estuarine/marine fish, "EPA concluded that longer-term risk to estuarine fish exceeded EPA's LOC for longer-term risk".

EPA Response: Since chronic data were not available for estuarine/marine fish, the preliminary risk assessment should not have suggested that an LOC was exceeded. The language in the risk assessment will be changed to reflect that chronic risk to estuarine/marine fish cannot be evaluated at this time, while noting that sublethal effects have been observed in estuarine/marine fish after exposure to methyl parathion.

Cheminova Comment: "EPA used the low-end value of 59 ppb for all estuarine fish species." This is not representative of the range of acute toxicity included in EPA's toxicity database. EPA also compares EECs to a single toxicity value (the most vulnerable) for all invertebrates, although toxicity values cover a range for different species. This adds to the uncertainty.

EPA Response: The EPA risk analysis is designed to assess risk to the most sensitive of the limited number of species tested in the laboratory, not to "typical" or "average" species. Our ecological risk assessments are founded on the assumption that if we protect the most sensitive tested species in the laboratory, then we provide some protection to the untested species in the environment. It is uncertain whether the "low-end" toxicity value is conservative enough, since untested species could very well be more vulnerable to pesticide exposure.

Cheminova Comment: EPA's risk assessment should give greater weight to higher quality studies. Studies using Cheminova's test material should be given more weight. Modern methyl parathion has fewer impurities.

EPA Response: All of the studies used to determine toxicological endpoints were reviewed by EPA scientists and determined to be scientifically valid. In that way, we ensure that scientifically sound data are used in our assessment. Open literature studies are cited to provide supplemental information that supports our assessment.

The guidelines for assessing whether the purity of the test substance is adequate are detailed in Subdivision E, which was published in 1982, found to be adequate in the Rejection Rate Analysis of 1994, and are still current today. Therefore, the scientifically valid studies that were used in EPA's assessment were performed with test substance of sufficient purity by current standards.

The "Industry Comment" on this subject in the Rejection Rate Analysis states:

> "Industry agrees that the guidance documents provide appropriate guidance, and that knowledge of the purity of the test substance is mandatory for a risk assessment. However, not all impurities may have to be known, unless there is reason to suspect the influence of impurities."

Comment: Cheminova used the Maximum Allowable Toxic Concentration (MATC) for their rebuttal assessment of chronic risk.

EPA Response: EPA uses the No Observed Adverse Effect Concentration (NOAEC) to establish endpoints for sublethal and chronic effects in fish and aquatic invertebrates, rather than the MATC. This has been adopted as EPA policy because: 1) the NOAEC is a more protective endpoint measure, and 2) the NOAEC is an empirically derived point against which to compare estimated concentrations. In addition, this value has been chosen because of the uncertainty in the MATC associated with extrapolating results across species, from laboratory to the field, from one effect to another, and from one generation to another.

Cheminova Comment: Many citations in the preliminary risk assessment did not have accompanying entries in the list of references.

EPA Response: EPA will provide full references for these citations. The majority of "missing" citations are identified in the preliminary risk assessment by an MRID number, which identifies a document within EPA's files.

<u>Comparison of USGS NAWQA Data to Cheminova's Revised Tox Endpoints</u>

PRZM-EXAMS Inputs vs. NAWQA Monitoring Data

Comment: Cheminova commented that since the concentrations detected in the NAWQA surface-water monitoring study were significantly lower than predicted by PRZM-EXAMS modeling, that the input parameters to the modeling were suspect.

EPA Response: EPA does not agree that this an indication of problems with the input parameters. The NAWQA program is a national survey surface-water (and ground-water) monitoring program which was not designed to provide exposure data for ecological risk assessments. EPA does not believe that it is appropriate to derive risk quotients for non-target aquatic organisms using data from the NAWQA monitoring study. It is unrealistic to assume that results from a discrete simulation scenario in PRZM-EXAMS would precisely reflect the results of a national monitoring program.

If one focuses on the study areas which correspond with regions of high methyl parathion usage, there is a wide disparity between the maximum amount of methyl parathion detected within NAWQA (<1 ppb), and the maximum concentrations simulated by PRZM-EXAMS (212 ppb). However, EPA does not believe that this is an indication that the modeling is of no use in risk assessment. Rather, use of the NAWQA data results in RQs that may not be sufficiently protective of non-target organisms for the following reasons:

- The 1-hectare pond is appropriate for assessing risk to non-target organisms; non-target aquatic organisms can be found in much smaller water bodies. The water bodies sampled in the NAWQA program range in size from drainage ditches to major waterways. The samples taken in the Mississippi Embayment study were taken from major tributaries to the Mississippi River, and yet methyl parathion was still detected at concentrations that would be expected to cause effects in aquatic invertebrates.

- Some of the samples in the NAWQA study were taken in areas of high methyl parathion use. However, there is no way to relate detections of methyl parathion to an actual application date. Whereas the PRZM-EXAMS model provides "day zero" concentrations to compare to the acute risk toxicity endpoints, the samples from the NAWQA study would not provide known, consistent data with relation to application dates.

Monitoring Data

Cheminova Comment: Cheminova disputes the use of SCI-GROW to derive a screening value of 0.6 ppb for drinking water derived from ground water. Cheminova states that "this assessment is severely flawed, because there is a large body of reliable ground water monitoring data that indicate extremely small exposure. The acute ground-water screening concentration calculated by the Agency is 0.600 ppb, a gross overestimation of ground water concentrations when compared to monitoring results. Accordingly, EPA proposes to require a ground water monitoring study."

Consumers Union Comment: Consumers Union believes a prospective ground-water monitoring study is necessary.

EPA Response: EPA stands by its use of the SCI-GROW screening value of 0.6 ppb for the acute drinking-water risk assessment. As stated in the preliminary risk assessment, EPA believes that "0.6 ppb is a reasonable, conservative estimate of possible acute concentrations of methyl parathion in drinking water derived from ground water," EPA a value that is protective of human health. There have been detections of methyl parathion in ground water with concentrations on the order of magnitude of this screening value, such as the detection of 0.256 ppb from a well in Mississippi reported in the Pesticides in Ground Water Database (PGWDB). EPA believes that chronic contamination of ground water is unlikely, and this is also reflected in the risk characterization of the preliminary risk assessment.

EPA did not request a ground-water monitoring study in the preliminary risk assessment for methyl parathion, and does not believe that such a study is necessary at this time. The screening value of 0.6 ppb has not been incorporated into the human-health risk assessment, as the estimated and observed surface-water concentrations described in the preliminary risk assessment were higher. If, through further refinements to the risk assessment, ground water becomes the "risk driver" for methyl parathion, EPA will revisit the issue. It is possible that ground-water monitoring studies would be called for in such a situation.

Cheminova Comment: In the NAWQA surface-water monitoring study, "the methyl parathion detection frequency was highest from the agricultural indicator sites (1.43 percent) and the highest detection (0.30 ppb) occurred at an agricultural indicator site in the South Platte River Basin. These rare detections of methyl parathion appear to occur in areas of relatively heavy methyl parathion use. Therefore, the data can be considered reliable."

EPA Response: Since the preliminary risk assessment was released, EPA has obtained recent, targeted surface-water monitoring data taken by the USGS from rivers in the Mississippi Embayment cotton-growing region. Samples were taken from five rivers in 1996 and 1997, and methyl parathion was detected in all five. Detected concentrations ranged up to **0.422 ppb**. The site with the highest frequency of detections in this study had **8 detections in 17 samples during water year (WY)1996, and 8 detections in 37 samples during WY1997.**

In another 1996 monitoring program in the Mississippi Embayment, the USGS detected methyl parathion in 18% of the 60 samples it collected from tributaries of the Mississippi River. The highest concentration detected was about 0.12 ppb, and the 50th percentile concentration was about 0.05 ppb.

Cheminova Comment: The surface water bodies sampled by the NAWQA program are not direct drinking-water samples.

EPA Response: As indicated in the preliminary risk assessment, methyl parathion is not on the Office of Water's regulated nor its unregulated contaminant monitoring lists. Therefore, public water supply systems are not required to analyze for it. As a result, EPA has relied on surface-water monitoring and simulation models in order to construct a conservative risk assessment protective of human health and the environment. EPA attempted to determine whether data from the Mississippi Embayment NAWQA study could be directly related to potential drinking water supplies.

Barbara Kliess, head of the MS Embayment NAWQA study, indicated that **the state of Mississippi derives its drinking water almost exclusively from ground water**, and that of the five stations sampled for methyl parathion, only one was within 25 miles of a surface-water body used for drinking water. Neighboring Louisiana, however, does have a number of public supplies which derive drinking water form surface-water sources.

Mary Gentry of the Louisiana State Department of Environmental Quality indicated that of the surface water supplies in the state, only two had laboratory facilities which might allow them to analyze for methyl parathion in their water supply. In addition, these two CWS were the only supplies that might have activated carbon filtration systems. This is significant, as Dr. Thomas Speth of EPA's Cincinnati lab indicated that carbon filtration would be the method of choice for the removal of methyl parathion from drinking water. Based on raw and finished drinking water data for malathion, it seems possible that methyl parathion would be converted to the more toxic methyl paraoxon during routine oxidative water sterilization.

The two community water sysems (CWS), located in New Orleans and in East Jefferson Parish, both draw their water from the Mississippi. Mr. Marvin Russell of the New Orleans CWS indicated that their system had not included methyl parathion as an analyte in their contaminant testing.

The Jefferson Parish CWS did test for methyl parathion in 1994 at two intakes on the Mississippi River. In this study, continuous raw water samples were collected with a peristaltic pump into a 5-gallon carbuoy. Composite samples so collected were analyzed weekly for a year. Methyl parathion was detected in 18 of 52 samples from the one bank of the river, and 21 of 52 from the other bank. The average concentration of the detections was 0.009 ppb, the level of detection. The highest concentration detected was 0.041 ppb.

While the samples analyzed in the Jefferson Parish study only reflect conditions of a single year, they are representative of possible chronic drinking-water contamination from a large surface-water source. The low concentrations are consistent with EPA's conclusion that methyl parathion should not pose a chronic risk to drinking water supplies. However, they are not useful in predicting possible acute exposure to methyl parathion.

Cheminova Comment: "The extensive monitoring for methyl parathion in surface water from NAWQA study sites across the United States for five years indicates that any potential exposure to methyl parathion in drinking water derived from surface water is extremely small."

EPA Response: The Mississippi Embayment NAWQA monitoring study, while representative of only two growing seasons in a limited geographic area, indicates that the rate of detection of methyl parathion can be high in areas of high use.

In the preliminary risk assessment, EPA stated that since "targeted monitoring studies are not available in connection with other methyl parathion uses (other than rice), surface-water concentrations simulated with PRZM-EXAMS for drinking water assessments should be considered highly conservative, but should not be arbitrarily reduced." The Mississippi Embayment study represents a region with extensive use of methyl parathion on cotton, the crop with the highest allowable annual application rate. While EPA does not know of the distance of monitoring locations from fields treated with methyl parathion, sampling for methyl parathion in this area is at least regionally targeted.

Therefore, EPA has even greater confidence in the conclusions of the risk characterization in the preliminary risk assessment. EPA can not state with confidence that the detection of 6 ppb found in a targeted (rice) monitoring study represents the highest surface-water concentration that might occur in areas of methyl parathion use. Given the lack of direct drinking water data, and uncertainties related to the effects of water treatment on methyl parathion, EPA can neither state with certainty that concentrations of methyl parathion detected in surface water correspond to the concentrations that might be detected in drinking water derived from surface water. EPA can only say that in evaluating drinking-water values for use in human-health risk assessment, there is greater confidence in targeted surface-water monitoring values such as the value of 6 ppb from rice-growing areas and 0.422 ppb from the Mississippi Embayment cotton-growing region than in the peak PRZM-EXAMS value for cotton of 254 ppb.

Cheminova Comment: It is reasonable to consider rice as worst-case for any crop when estimating possible methyl parathion surface-water contamination. Recent, low-level detections of methyl parathion in surface-water from California rice drainage represent the highest concentrations that should be expected.

EPA Response: EPA does not agree. The recent California surface-water monitoring data cited by Cheminova reflects mitigation measures instituted by the State. The 24-day holding time for drainage water results in greatly reduced concentrations of methyl parathion from the maximum of 6 ppb detected before the mitigation was in effect. In addition, rice grown in other regions will not be subject to the mitigation mandated in California.

Cheminova Comment: NAWQA monitoring data are acceptable because the analytical recovery for concentrations > 0.1 µg/L "*is generally above 70 percent for surface water and reagent water*". They indicated that recoveries at concentration < 0.1 µg/L or in groundwater are lower, but reproducible. Since USGS considers the methyl parathion data as reliable (no estimated values), the registrant suggest the Agency should accept the data for risk assessment purposes.

EPA Response: As stated in the preliminary risk assessment, the average analytical recovery of methyl parathion is 46% (± 13%). The GC/MS method for methyl parathion has an minimum detection limit (MDL) of 0.006 µg/L. Further review indicates the recovery of methyl parathion ranged from 73% (±15%) at 0.1 µg/L to 92% (±6%) at 1 µg/L in reagent water; 71% (±8) at 0.1 µg/L to 62%(±5%) at 1 µg/L in South Platte River water (surface water); and 47% (±5%) at 0.1 µg/L to 53%(±3%) at 1 µg/L in water from Denver Federal Center Well 15 (ground water). Recovery of methyl parathion was dependent on the concentration and sample matrix. In reagent water, methyl parathion recovery was significantly lower ($p< 0.05$) in samples with a concentration of 0.1 ug/L samples. Methyl parathion recovery in surface water was significantly higher ($p<0.05$) in samples with a concentration of 0.1 ug/L. There were no statistical differences ($p<0.05$) in methyl parathion recoveries found in ground water samples.

The detection frequency of methyl parathion in NAWQA ranged from 0.72% at concentrations > 0.01 µg/L and 0.52% at concentrations > 0.05 µg/L in 37 agricultural streams; 0.66% at concentrations > 0.01 µg/L and 0.33% at concentrations > 0.05 µg/L in 11 urban streams; 0.36% at concentrations > 0.01 µg/L and no detections at concentrations > 0.05 µg/L in 14 integrator sites with mixed land use; 0.18% at concentrations > 0.01 µg/L and 0.09% at concentrations > 0.05 µg/L in shallow ground water; and not detected in major aquifers.

The detection frequency of methyl parathion concentrations > 0.05 µg/L was extremely low in both ground and surface water samples. Based on an analytical recovery of 46% ± 13%, it is possible that the reported methyl parathion detections underestimate the "actual" methyl parathion concentrations by 41 to 67%. Because the majority of methyl parathion concentrations are < 0.05 µg/L (a concentration range not covered by the method analysis), it reasonable to expect an underestimation of methyl parathion concentration. Such a problem limits quantitative assessment of the NAWQA data.

Cheminova Comment: "Cheminova believes that the EECs from the overly conservative GENEEC model should not be used when EECs from PRZM/EXAMS modeling are available, and that GENEEC results have no role in higher-tier risk assessments."

EPA Response: PRZM/EXAMS was run for a set of crops which spanned the range of labeled application rates for methyl parathion. The GENEEC EECs are shown for crops for which PRZM/EXAMS modeling was done in order to show the effect of running the Tier II model on the magnitude of the EECs. EPA included the GENEEC EECs for the other crops in the same table, implying that further refinement of those values would likely result in EECs reductions of a similar magnitude.

EPA did not use GENEEC results for the higher-tier ecological risk assessment. The risk characterization compares only PRZM/EXAMS EECs to toxicity endpoints. The one instance in which a GENEEC value was mentioned in the risk characterization is the comparison of monitoring data to the GENEEC number for rice. This is used to illustrate the uncertainty in GENEEC EECs.